

3426 E 89TH STREET, LLC
ELECTRIC GENERATION FACILITY
CHICAGO, ILLINOIS

PROJECT SUMMARY

I. INTRODUCTION

3426 E 89th Street, LLC (89th Street) has requested a permit for the construction of a natural gas-fired generating facility capable of producing approximately 550 megawatts of electricity. The power plant would consist of two “combined cycle” natural gas fired turbines that would generate of electricity. The project would be a major source of air emissions pursuant to the federal Prevention of Significant Deterioration rules (40 CFR52.21).

The project would be located at the former USX site on a parcel of property adjacent to Lake Michigan in Chicago. The site is being redeveloped as a brownfield site and will be surrounded by commercial and industrial facilities.

II. PROJECT DESCRIPTION

The proposed facility will consist of two combined cycle combustion turbine generators (CTGs) each provided with its own heat recovery steam generator (HRSG). The HRSG will be equipped with duct burners. The duct burners are burners in the ductwork between the turbines and the HRSG that can be used to increase the steam output of the facility. They are generally fired when just the turbine burners are not enough to supply the needed power. There will also be steam electric turbine generators, surface condensers serving the steam turbines and two auxiliary boilers at the facility. A chilling system installed at the inlet to each CTG will be utilized to enhance the overall output of the plant by means of lowering the temperature entering the turbines.

The generating units will utilize natural gas as their only fuel. Duct burners (supplemental firing) fueled by natural gas will be used to generate additional heat in the HRSG’s.

The nitrogen oxides (NO_x) emissions from each unit are controlled through the use of add-on Selective Catalytic Reduction (SCR) in the HRSG. SCR uses a catalyst operated in an appropriate temperature range that normally is present in one section of the HRSG to control NO_x, by reaction with ammonia, urea or other similar chemicals. The NO_x is converted back into nitrogen and oxygen, as originally present in the atmosphere, and water is formed as a byproduct.

CO is formed by the incomplete combustion of fuel. CO is associated with most combustion processes and is found in measurable amounts in turbine exhaust. The CO emissions from the proposed turbines will be controlled by providing adequate fuel residence time and high temperature in combustion zone to ensure complete combustion and with an oxidation catalyst in the HRSG.

VOM and PM/PM₁₀ are also emitted as a result of incomplete combustion of fuel. VOM is controlled by providing adequate fuel residence time and high temperature in combustion zone to ensure complete combustion. In addition, 89th Street has proposed to install an oxidation catalyst in the HRSG to further control emissions of VOM. This catalyst system is effective for both VOM and CO, as discussed above. PM/PM₁₀ are controlled by proper combustion control and firing natural gas fuel, which has negligible ash content. SO₂ is found only in trace amounts from combustion of natural gas.

The project will have cooling towers to dissipate waste heat from the steam cycle. Hot water from the steam turbine condensers and other heat exchangers at the facility is routed to the cooling towers. In turn, cooled water from the cooling tower basin is returned to this process equipment.

Natural gas-fired auxiliary boilers will be used to maintain steam flow and operating temperature within the HRSG's and steam turbine while the combustion turbines are off line. The auxiliary boilers will also be used to pre-heat natural gas until the HRSG's are at normal operation.

The facility will also be equipped with a backup diesel generator.

III. PROJECT EMISSIONS

Emissions of combustion products (carbon monoxide (CO), nitrogen oxide (NO_x), particulate matter/particulate matter <10 microns (PM/PM₁₀), sulfur dioxide (SO₂), volatile organic material (VOM), and formaldehyde (which is a hazardous air pollutant or HAP) will result from the combustion of fuel in the turbines, HRSG duct burners and auxiliary boilers. The cooling towers utilized in conjunction with combined cycle operation are also sources of PM emissions.

The potential emissions from the proposed facility are noted below. The emissions are based on operation at maximum load for 8,760 hours per year.

Potential Project Emissions (ton/yr)	
<u>Pollutant</u>	<u>Project Potential</u>
CO	164
NO _x	134
PM/PM ₁₀	99
VOM	24
SO ₂	30

IV. APPLICABLE REGULATIONS

A. GENERAL

The proposed project will comply with applicable state and federal air pollution control laws and rules, including the Illinois Environmental Protection Act, the federal Clean Air Act, the Illinois Air Pollution Control Board emission standards and regulations (35 Ill. Adm. Code: Subtitle B) and applicable federal emission standards.

B. ADDITIONAL REQUIREMENTS FOR NEW MAJOR SOURCES

The project is in an area classified as nonattainment for ozone and PM₁₀ and attainment for all other criteria pollutants. The new source will be a major stationary source under PSD regulations because, emissions of NO_x, and CO trigger the applicability of the Prevention of Significant Deterioration Air Quality regulations (PSD), 40 CFR 52.21. Therefore, the proposed project at the 3426 E 89th Street, LLC facility will be subject to additional requirements imposed by the federal rules for PSD for these pollutants.

With respect to Ozone and PM₁₀, the proposed project is located in an area that is designated nonattainment. The rules that govern major projects in nonattainment areas are the major stationary sources Construction and Modification (MSSCAM), 35 IAC Part 203. The proposed project will not be a major source for VOM and PM, as potential emissions of VOM and PM are limited to less than 25 tons and 100 tons per year, respectively.

Catalytic oxidation system proposed to control CO emissions will also control VOM emissions. If the project were major for VOM, the control measures for VOM would have had to meet the Lowest Allowable Emission Rate (LAER). The result most likely would have been a requirement for use of oxidation catalyst systems, as already proposed for the project.

Part 63 National Emissions Standards for HAPs apply to major sources, defined as potential to emit 10 tons per year or greater for any single HAP or potential to emit 25 tons per year or greater for total HAPs. The available data for HAP emissions indicates that the proposed facility will not be a major source of HAPs. The HAPS emitted by the facility would be organic compounds that also qualify as VOM. As such, they will be controlled by the measures being used for VOM emission control.

V. PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

A project that constitutes a major new source in an attainment area is subject to the federal PSD rules. The PSD rules were established to ensure that new sources will not adversely impact “clean air” areas and will comply with applicable standards.

A PSD review requires: 1) a case-by-case Best Available Control Technology (BACT) determination, taking into account energy, environmental and economic impacts, as well as technical feasibility; 2) an ambient air quality impact analysis, including a baseline determination and dispersion modeling, to determine whether the allowable emissions from the source would cause or contribute to a violation of the applicable PSD increment or National Ambient Air Quality Standard (NAAQS); 3) an assessment of the impact on soils, vegetation and visibility; and, 4) public notice and comment, including an opportunity for public hearing. The Illinois EPA has been delegated authority by the USEPA to administer the federal PSD program.

A. BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

BACT is defined as an emission limitation based on the maximum degree of pollution reduction determined on a case-by-case basis considering technical, economic, energy and environmental considerations.

A BACT analysis was conducted for NO_x and CO, in order to determine the most appropriate level of control required at the facility for these pollutants. In considering the technical, economic, energy and environmental considerations, the Illinois EPA determined that the project would utilize BACT.

As determined by Illinois EPA, BACT will include use of dry low-NO_x combustors on the CTGs and SCR in the HRSGs. While firing natural gas only, the CTG/HRSGs will meet a maximum NO_x emission rate of 2.5 ppmvd at 15% oxygen on a 24-hour average and 3.5 ppmvd at 15% oxygen on an hourly average, including any emissions from the duct burners. BACT will also include utilization of low-NO_x burners with the auxiliary boiler to minimize emissions of NO_x. These practices represent the stringent level of control for NO_x required on CTGs and combined cycle units in other similar projects across the country.

The proposed facility will employ good combustion control design and catalytic oxidation systems to comply with the CO BACT requirements for the CTGs. CO emissions from the CTG/HRSGs will be maximum 3 ppmvd at 15% oxygen on a 24-hour average, including any emissions from the duct burners. The oxidation catalyst system to control CO emission reflects a determination by the Illinois EPA that the use of these systems, which are proposed to control CO emissions, will also reduce VOM emissions.

The natural gas fired auxiliary boilers, and backup diesel generator will employ good combustion design to control CO emissions.

Use of natural gas and good combustion practices will be used at the proposed plant to minimize emissions of PM/PM₁₀ and SO₂.

The cooling towers at the proposed facility must be equipped with high efficiency drift eliminators to minimize loss of water droplets from the cooling towers and associated PM/PM₁₀ emissions.

B. AIR QUALITY ANALYSIS

An ambient air quality analysis was conducted by Stanley Consultants, on behalf of 89th Street to assess the impacts of the increased emissions due to the proposed project. Under the PSD rules, this analysis must determine whether the proposed project will cause or contribute to a violation of any applicable air quality standard.

Modeling was done for NO_x, CO, SO₂ and PM/PM₁₀ incorporating the permitted emissions at the power generation facility and major stationary sources in surrounding areas. The analysis performed conforms to the guidance and requirements of the USEPA and the Illinois EPA.

Impact Analysis

The impact analysis summary results are shown below along with the corresponding regulatory-defined significant impact levels, which show the maximum potential ambient impacts resulting solely from the proposed facility. Since all preliminary analysis results are below the significant impact levels, the air quality analysis is complete and protection of air quality has been demonstrated.

SIGNIFICANT IMPACT ASSESSMENT

Pollutant	Averaging Period	Maximum Modeled Concentration (ug/m ³)	Significant Impact Level (ug/m ³)
SO ₂	3-Hour	1.33	25
SO ₂	24-Hour	0.53	5
SO ₂	Annual	0.017	1
PM10	24-Hour	2.66	5
PM10	Annual	0.27	1
CO	1-Hour	71.12	2000
CO	8-Hour	40.88	500
NO _x	Annual	0.91	1

Startup Modeling

Startup modeling summary results are shown below for pollutants for which there is NAAQS that applies as an hourly or three-hour average, along with the corresponding NAAQS. Although a full impact analysis is not required since project impacts were below the SILs, a comparison of startup modeling results indicates that the impacts are well below the NAAQS.

START-UP MODE MODELING RESULTS

Pollutant	Averaging Period	Maximum Modeled Concentration (ug/m ³)	NAAQS (ug/m ³)
CO	1-Hour	2366.43	40000
SO2	3-Hour	0.21	1300

C. ASSESSMENT OF ENVIRONMENTAL IMPACTS

The ambient air quality assessment performed also assessed the potential impact of the project on soils, vegetation and visibility, showing that the project would not cause any adverse effect.

VI. PROPOSED PERMIT

The conditions of the proposed permit contain limitations and requirements on the proposed plant. The permit identifies the measures that must be used as BACT to control NO_x, and CO emissions from the proposed emission units. The permit also establishes appropriate compliance procedures, including inspection practices, recordkeeping requirements and reporting requirements.

VII. REQUEST FOR COMMENTS

It is the Illinois EPA's preliminary determination that the proposed permit meets all applicable state and federal air pollution control requirements. The Illinois EPA is therefore proposing to issue a permit for construction at the 89th Street Facility.

Comments are requested on this proposed action by the Illinois EPA and the proposed conditions on the draft permit.